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Employees Retirement System of the City of St. Louis

Actuarial Valuation as of October 1, 2021

Produced by Cheiron

February 2022

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LETTER OF TRANSMITTAL

February 7, 2022

Board of Pension Trustees
Employees Retirement System of the City of St. Louis
1114 Market Street, Suite 900
St. Louis, Missouri 63101

Dear Members of the Board:

At your request, we have conducted an actuarial valuation of the Employees Retirement System of the City of St. Louis as of October 1, 2021. The valuation is organized as follows:

- In Section I **Board Summary,** we describe the purpose of an actuarial valuation and summarize the key results found in this valuation.
- The **Main Body** of the report presents details on the System:
  - Section II - Identification and Assessment of Risk
  - Section III - Assets
  - Section IV - Liabilities
  - Section V - Contributions
  - Section VI - Accounting Statement Information
- In the **Appendices,** we conclude our report with detailed information describing the System's membership (Appendix A), actuarial assumptions and methods employed (Appendix B), and a summary of pertinent plan provisions (Appendix C).

The results of this report rely on future System experience conforming to the underlying assumptions. To the extent that actual System experience deviates from the underlying assumptions, the results will vary accordingly. The actuarial assumptions were adopted by the Board based on our recommendations from the experience study performed for the period October 1, 2014 through September 30, 2019.

The purpose of this report is to present the annual actuarial valuation of the Employees Retirement System of the City of St. Louis. This report is for the use of the Board and its auditors in preparing financial reports in accordance with applicable law and accounting requirements. The report does not include calculations related to GASB Statements No. 67 and 68, which are provided in a separate report.

In preparing our report, we relied on information supplied by the Employees Retirement System of the City of St. Louis staff. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standards of Practice No. 23.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice as set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This actuarial report was prepared exclusively for the Employees Retirement System of the City of St. Louis for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

Sincerely,
Cheiron

Stephen T. McElhaney, FSA, FCA, EA
Principal Consulting Actuary

Michael J. Noble, FSA, FCA, EA
Principal Consulting Actuary

Patrick Nelson, FSA, CERA, EA
Consulting Actuary

SECTION I – BOARD SUMMARY

The primary purpose of the actuarial valuation and this report is to measure, describe and identify as of the valuation date:

- The financial condition of the System,
- Past and expected trends in the financial progress of the System,
- The employers' contributions for Fiscal Year ending 2022, and
- Information required for accounting statements.

In the balance of this Board Summary, we present (A) the key findings of this valuation including a summary of all key financial results, (B) an examination of the historical trends, and (C) the projected financial outlook for the System.

Whereas there remains a lot of uncertainty during the COVID-19 pandemic, we continue to monitor developments and the impact it may have on the System. Actual experience, both demographic and economic, will be reflected in subsequent valuations as experience emerges.

A. Key Findings of this Valuation

The key results of the October 1, 2021 actuarial valuation are:

- The System's funded ratio, the ratio of actuarial asset value over liabilities, increased from 77.6% as of October 1, 2020 to 79.3% as of October 1, 2021.

- The unfunded actuarial liability (UAL) for the System decreased from $243 million on October 1, 2020 to $227 million on October 1, 2021.

- The actuarially determined employer contribution rate for the City as a percent of total compensation increased from 15.42% as of October 1, 2020 to 15.44% as of October 1, 2021. While the funded ratio of the System improved during the year, there was a decrease in covered payroll which resulted in a small contribution rate increase as a percentage of payroll.

- For the "Lawsuit Beneficiary Employers", the actuarially determined contribution rate has been decreased by 0.08% of compensation. Further information about this adjustment can be found in the description of the amortization method in Appendix B.

- There was an actuarial experience gain during the year of $13.1 million.

    - During the year ended September 30, 2021, the System's assets had a 20.88% return on a market value basis, but due to smoothing of prior investment gains and losses, the return on the actuarial asset value was 8.33% (as compared to 7.25% investment return assumption). This resulted in an actuarial gain on investments of $8.8 million.

SECTION I – BOARD SUMMARY

- On the liability side, the System experienced a total gain of $4.3 million. Notable gains were a $4.2 million from the COLA increase for retiree benefits being less than expected, a $2.2 million due to inactive mortality, and $2.5 million due to active mortality. These were partially offset by losses of $3.1 million from salary increases being greater than expected, and $0.7 million for new entrants and rehires. A detailed listing of all experience gains and losses can be found in Table IV-3.

- Offsetting the actuarial experience gain, an increase of the UAL of $2.2 million was created because contributions were less than expected.

SECTION I – BOARD SUMMARY

The following Table I-1 summarizes all the key results of the valuation with respect to the System's membership, assets and liabilities, and contributions. The results are presented and compared for both the current and prior plan year.

Table I-1
Employees Retirement System of the City of St. Louis
Summary of Principal Results

Valuation as of:	October 1, 2020	October 1, 2021	% Change
Participant Counts			
Active Participants[1]	4,984	4,742	(4.86%)
Disabled Participants	178	170	(4.49%)
Retirees and Beneficiaries	4,712	4,786	1.57%
Terminated Vested Participants	2,561	2,566	0.20%
Total	**12,435**	**12,264**	**(1.38%)**
Annual Salaries of Active Members	$ 228,162,770	$ 223,736,639	(1.94%)
Annual Retirement Allowances for Retired Members and Beneficiaries	$ 62,608,584	$ 65,125,742	4.02%
Assets and Liabilities			
Actuarial Liability (AL)	$ 1,084,125,462	$ 1,094,688,216	0.97%
Actuarial Value of Assets (AVA)	841,450,402	867,593,392	3.11%
Unfunded Actuarial Liability (UAL)	$ 242,675,060	$ 227,094,824	(6.42%)
Funded Ratio (AVA / AL)	77.6%	79.3%	
Market Value of Assets (MVA)	$ 800,291,676	$ 920,789,804	15.06%
Funded Ratio (MVA / AL)	73.8%	84.1%	
Contributions as a Percentage of Payroll	**Fiscal Year 2021**	**Fiscal Year 2022**	
Normal Cost Rate	5.59%	5.56%	
Administrative Expense Rate	0.40%	0.40%	
City UAL Rate	9.43%	9.48%	
Total City Contribution Rate	15.42%	15.44%	
Reduction in UAL Rate for Lawsuit Beneficiary Employers	0.08%	0.08%	
Total Contribution Rate for Lawsuit Beneficiary Employers	15.34%	15.36%	
Actuarially Determined Contribution	$ 35,133,462	$ 34,501,973	(1.80%)

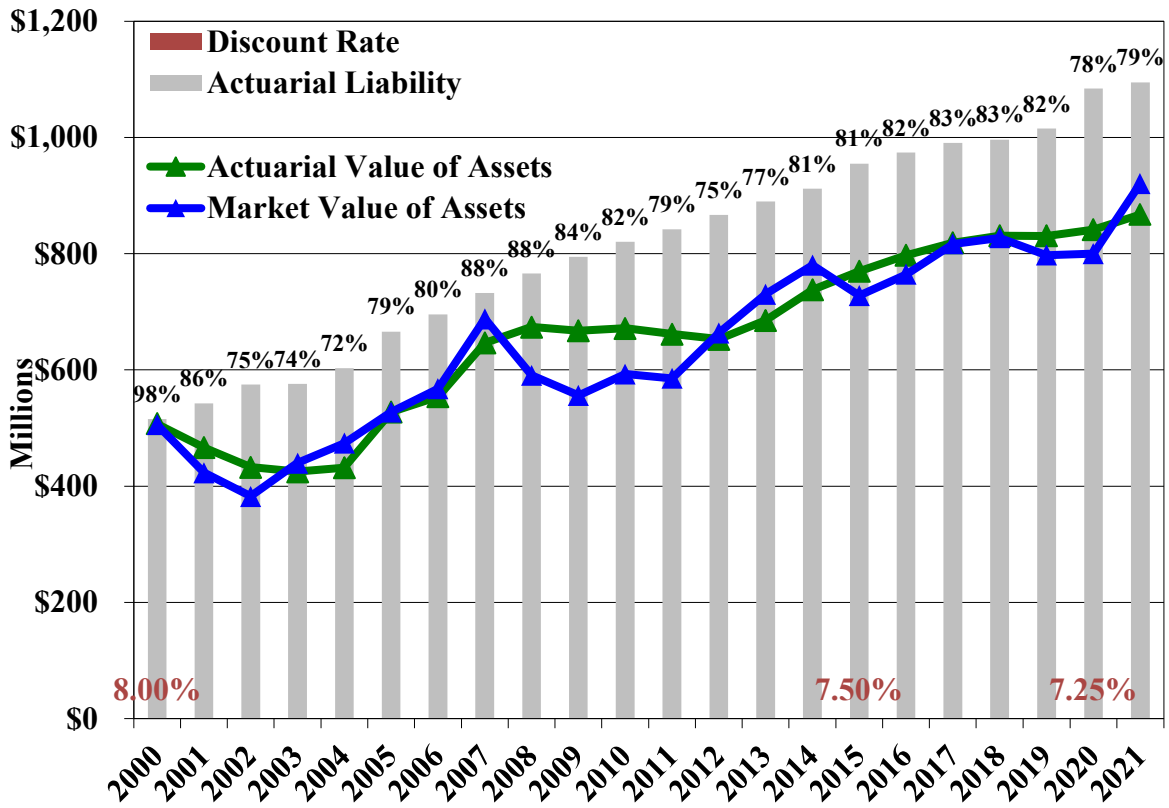
[1]Includes 414 DROP participants as of October 1, 2020 and 403 DROP participants as of October 1, 2021.

B. Historical Trends

Despite the fact that for most retirement systems the greatest attention is given to the current valuation results and in particular the size of the current unfunded actuarial liability and the employer's contribution, it is important to remember that each valuation is merely a snapshot in the long-term progress of a pension fund. It is more important to judge a current year's valuation result relative to historical trends, as well as trends expected into the future.

Assets and Liabilities

There was an increase in the market value of assets (MVA) from $800 million to $921 million, due to a 20.88% investment return during the year. This is significantly greater than the investment return assumption of 7.25% per year. The actuarial value of assets (AVA) increased from 2020 to 2021 returning 8.33% which reflects the investment gain from 2021, partially offset by smaller investment losses from the prior three years, 2018-2020. With the asset smoothing method in place, the actuarial value of assets has tracked a smoother path through the volatility of the market over recent years.

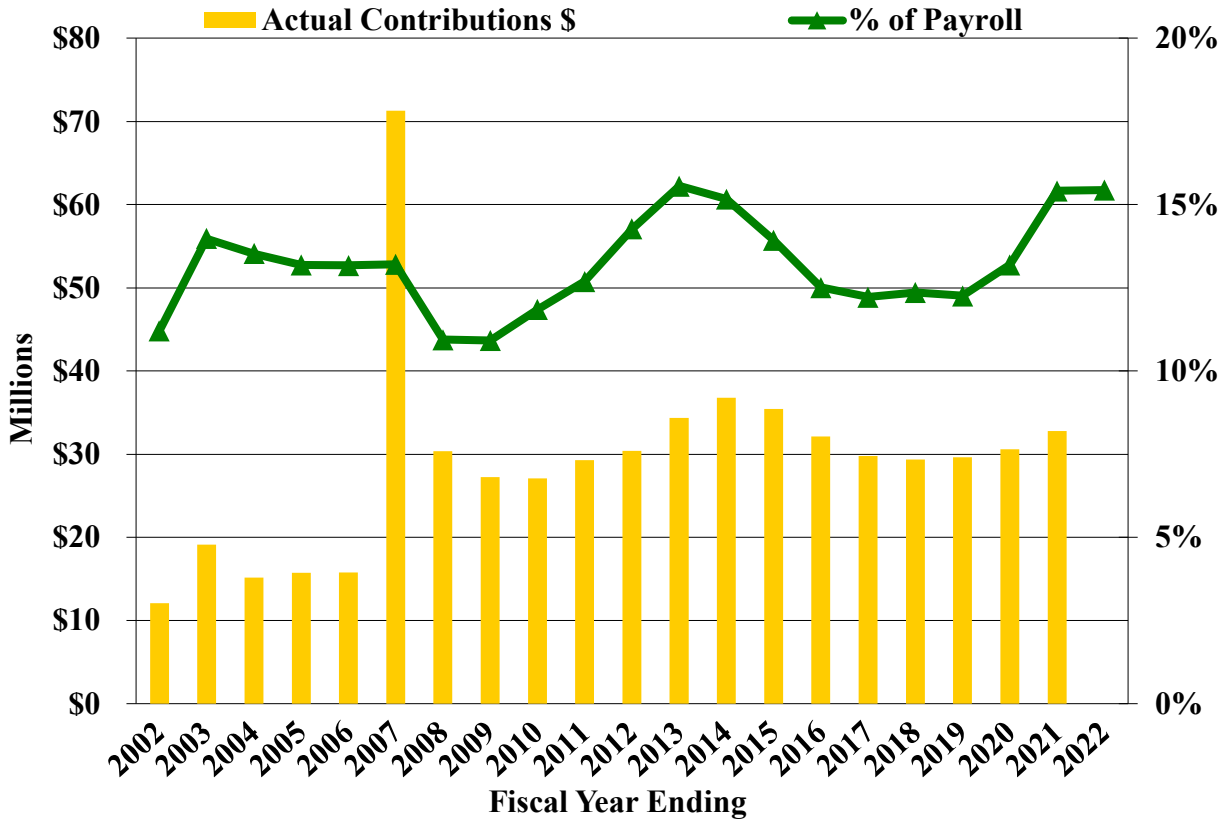


SECTION I – BOARD SUMMARY

The previous chart compares the actuarial value of assets to the actuarial liabilities and shows the funded ratio, which is a comparison of the Actuarial Value of Assets and Actuarial Liability. This chart shows that the funded ratio had decreased for the four valuations prior to 2013 due to the delayed recognition of the substantial market losses in 2008 and 2009, then slowly increased as the market rebounded beginning in 2012, with the exception of 2020. The funded ratio decreased in 2020 primarily as a result of demographic and economic assumption changes, as well as lower than expected asset returns. The numbers in red denote changes to the net investment return assumption.

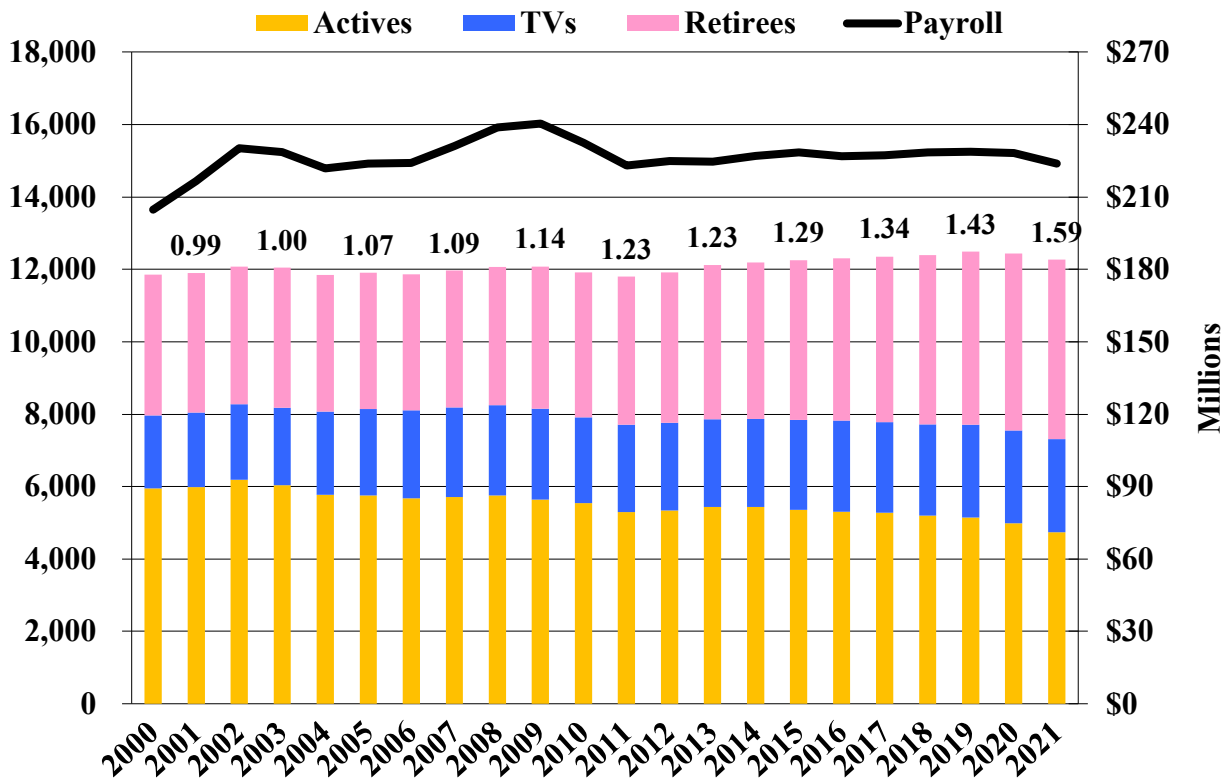
Contribution Rates

The yellow bars in the graph below show the dollar amount of contributions made to the System (depicted on the left-hand scale) since Fiscal Year Ending 2002. The green line shows the actuarial contribution rate (combined for all employers) as a percent of payroll (depicted on the right hand scale). Members do not make contributions to the System. The actuarial contribution rate as a percent of payroll increased slightly from 15.42% of payroll in 2020 to 15.44% of payroll in 2021 primarily due to a decrease in payroll during the year while also experiencing investment and liability gains.



SECTION I – BOARD SUMMARY

Participant Trends



The above chart provides a measure for the maturity in the System, by comparing the ratio of inactive members (retirees and terminated-vesteds) to active members. The inactive-to-active ratio has generally increased since 2000 from 1.0 inactive member for each active member to 1.6 inactive members for each active member today. This increase is not necessarily bad in itself, but as more of the liability moves from actives to inactives, the System will experience more volatility in contribution rates when actuarial gains and losses are recognized.

C. Future Expected Financial Trends

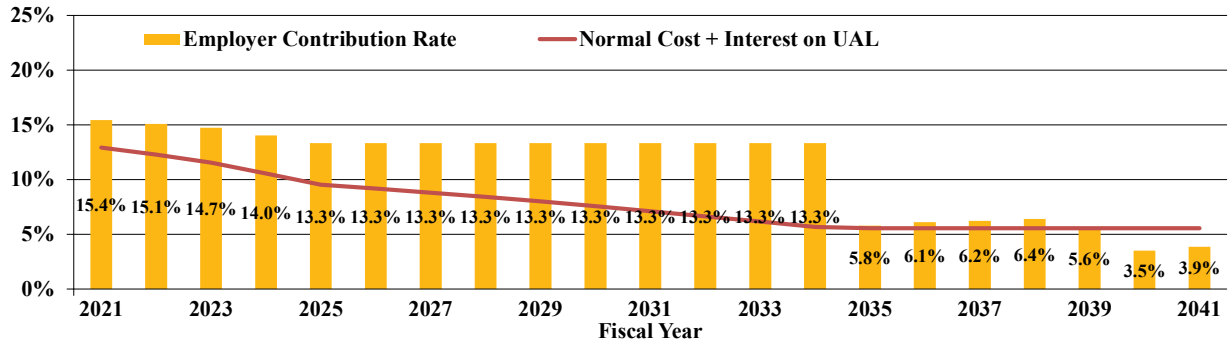
The analysis of projected financial trends is perhaps the most important component of this valuation. In this section, we present the implications of the October 1, 2021 valuation results in terms of (1) the projected employer contributions, and (2) the projected System's funded status (ratio of assets over liabilities). We assume future investment returns of 7.25% each year. The projections assume there will be no future gains or losses on the liability and that the total covered plan payroll will increase at the rate of 2.5% per year.

1. Contribution Rate Projection

The chart shows the employer's projected actuarially determined combined contribution rates (gold bars). The years shown in the charts are plan years beginning October 1st.

Baseline returns of 7.25%

The chart below shows that the actuarially determined contribution rate will gradually decrease from 15.4% to 13.3% by 2034 when the 2015 unfunded liability base has been fully amortized. In 2035, the contribution rate drops sharply to 5.8%. These projections assume that the System earns the assumed investment rate of 7.25% per year on market value. The expected decrease in contributions over the next few years is due to the continued recognition of this year's investment gain into the actuarial value of assets.



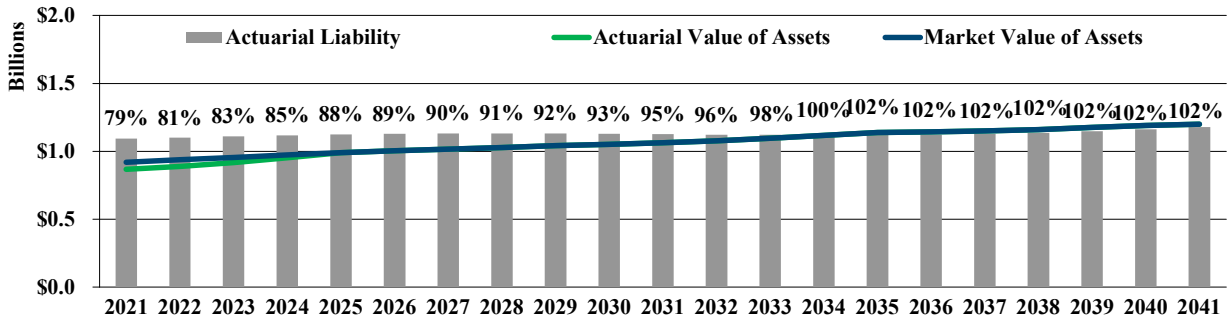
SECTION I – BOARD SUMMARY

2. Asset and Liability Projection

This next projection chart compares the market value of assets (blue line) and the actuarial or smoothed value of assets (green line) to the System's actuarial liabilities (gray bars). In addition, above the bars, we show the System's funded ratio (ratio of actuarial value of assets to actuarial liabilities). The projections assume that the actuarially determined contributions, as shown in the previous chart, are made each year. The years shown in the chart signify the valuation date as of October 1st.

Baseline returns of 7.25%

Assuming that the System earns the investment rate assumption of 7.25%, the funded ratio will increase from 79% to 102% during the 20 year projection period.



SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Actuarial valuations are based on a set of assumptions about future economic and demographic experience. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different. This section of the report is intended to identify the primary risks to the System, provide some background information about those risks, and provide an assessment of those risks. Some of the charts within this section compare measures calculated for the Employees Retirement System of the City of St. Louis to plans within the *Public Plans Database*. Information regarding this data can be found at https://publicplansdata.org/.

Identification of Risks

The fundamental risk to a pension plan is that the contributions needed to pay the benefits become unaffordable. While we believe it is unlikely that the Plan by itself would become unaffordable, the contributions needed to support the Plan may differ significantly from expectations. While there are a number of factors that could lead to contribution amounts deviating from expectations, the primary sources are:

- Investment risk,
- Interest rate risk,
- Longevity and other demographic risks, and
- Assumption change risk.

Other risks that we have not identified may also turn out to be important.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

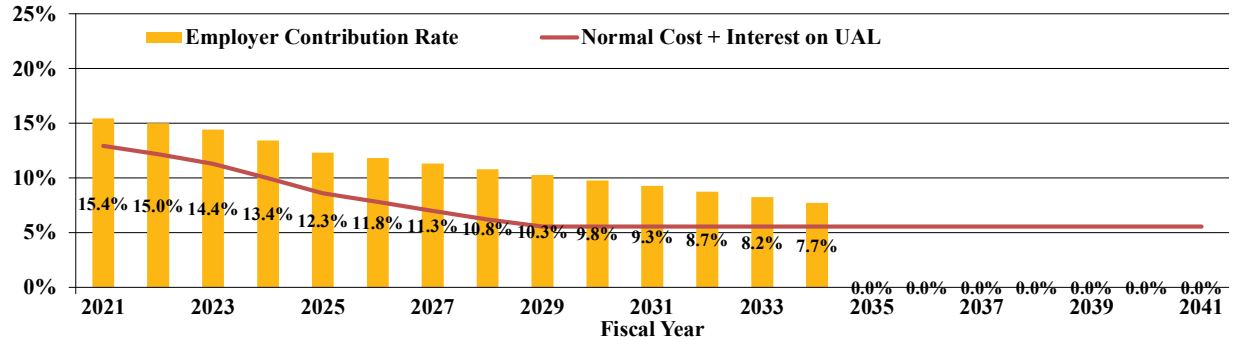
Investment Risk is the potential for investment returns to be different than expected. Lower investment returns than anticipated will increase the Unfunded Actuarial Liability necessitating higher contributions in the future unless there are other gains that offset these investment losses. The potential volatility of future investment returns is determined by the System's asset allocation, and the affordability of the investment risk is determined by the amount of assets invested relative to the size of the plan sponsor or other contribution base.

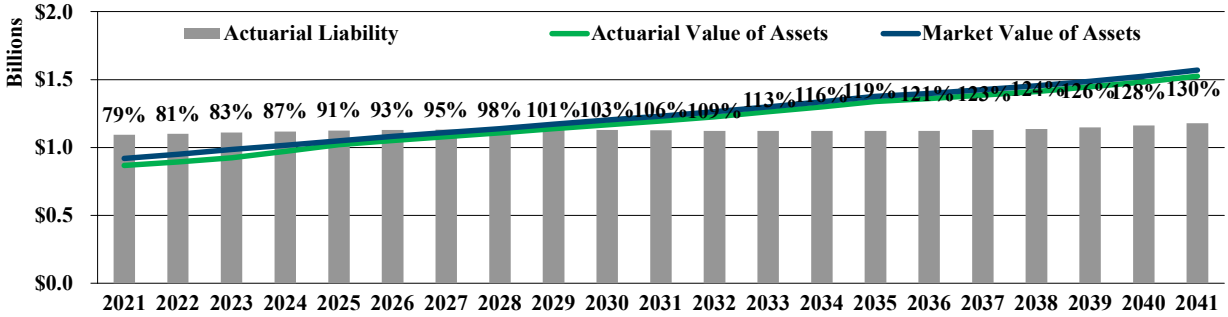
For stress testing purposes, we include two scenarios to illustrate the impact actual investment returns may have on future funded status and contribution amounts compared to the baseline scenario presented at the end of Section I of this report. The two scenarios are (1) optimistic returns of 8.75% each year and (2) pessimistic returns of 5.75% each year

As with the baseline, we present the implications of the October 1, 2021 valuation results in terms of the projected employer contributions, and projected System's funded status (ratio of assets over liabilities).

1. Optimistic returns of 8.75%

If the System earns 1.50% more than the assumed rate in each year of the projection, the actuarially determined contribution rate will steadily decrease to about 7.7% by 2034. In 2035, the contribution rate would drop to 0.0%. The funded ratio is projected to increase above 100% by 2029 and 130% by the end of the 20-year projection period despite no contributions being made in the final few years of the period.

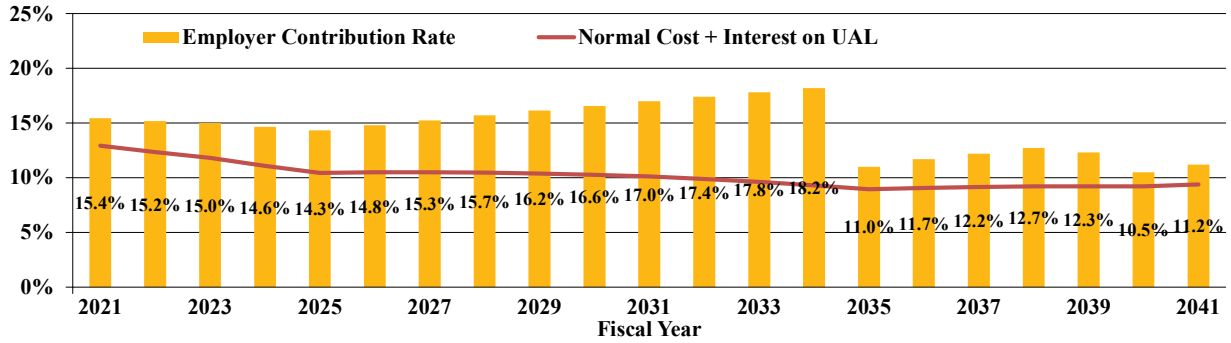


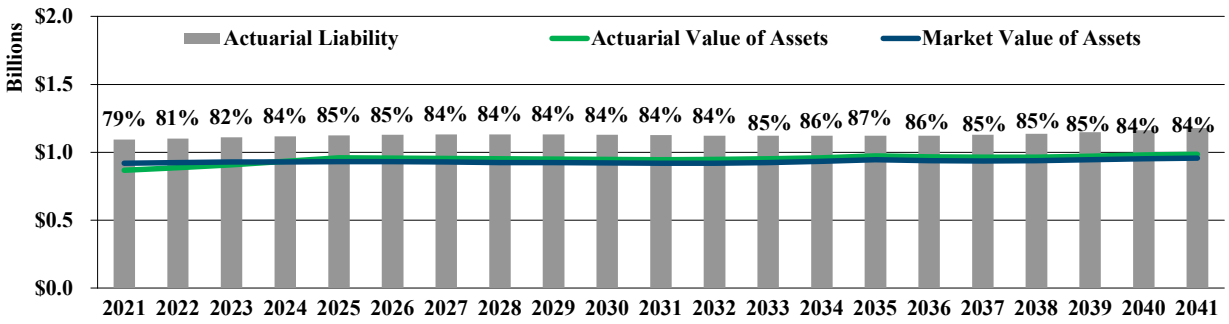


SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

2. Pessimistic returns of 5.75%

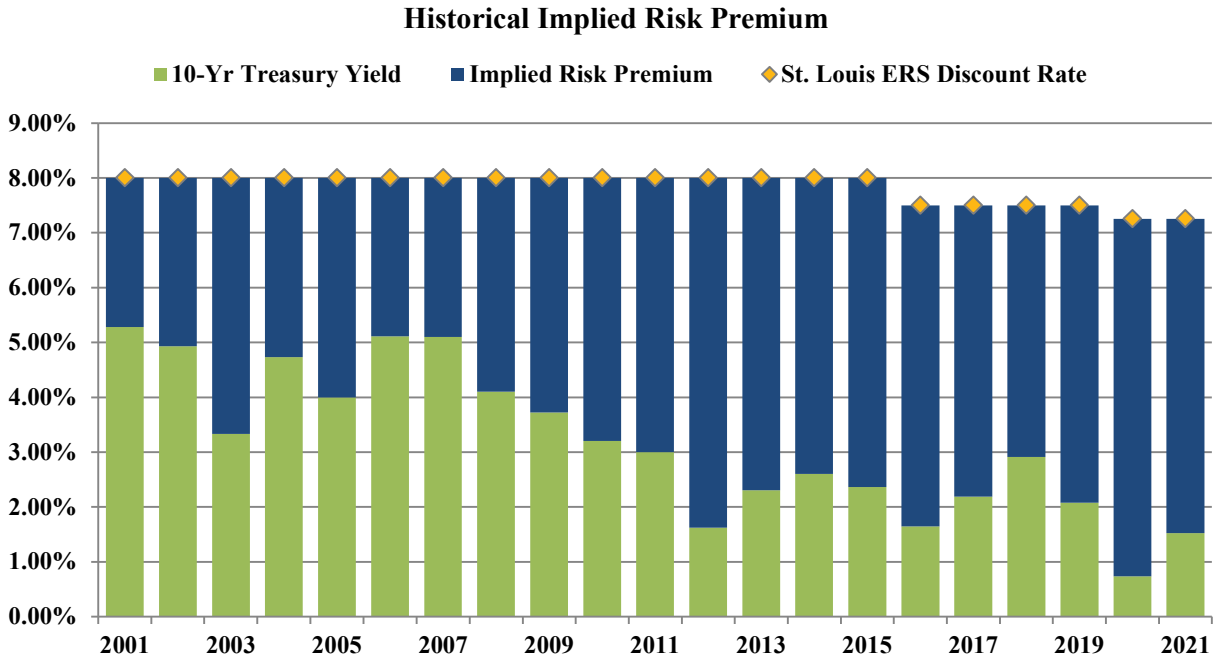
If the System earns 1.50% less than the assumed rate in each year of the projection, the actuarially determined contribution rate will initially decrease as the 2021 investment gains are recognized before increasing to 18.2% as of 2034. In 2035, the rate is projected to decrease to 11.0% after the initial unfunded liability has been paid off. The funded ratio will increase to 85% as the 2021 investment gain is recognized and then stay fairly level for the remainder of the 20-year projection period due to the significant increase in contributions attributable to the underfunding.





SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Interest rate risk is the potential for interest rates to be different than expected. For public plans, short-term fluctuations in interest rates have minimal effect on the Plan's liability which is measured based on the expected return on assets. Longer-term trends in interest rates, however, can have a powerful effect on the System. The chart below shows the yield on a 10-year Treasury security compared to the System's assumed rate of return. The difference is a simple measure of the amount of investment risk taken. As interest rates have declined, plans faced a choice: maintain the same level of risk and reduce the expected rate of return, maintain the same expected rate of return and take on more investment risk, or some combination of the two strategies.

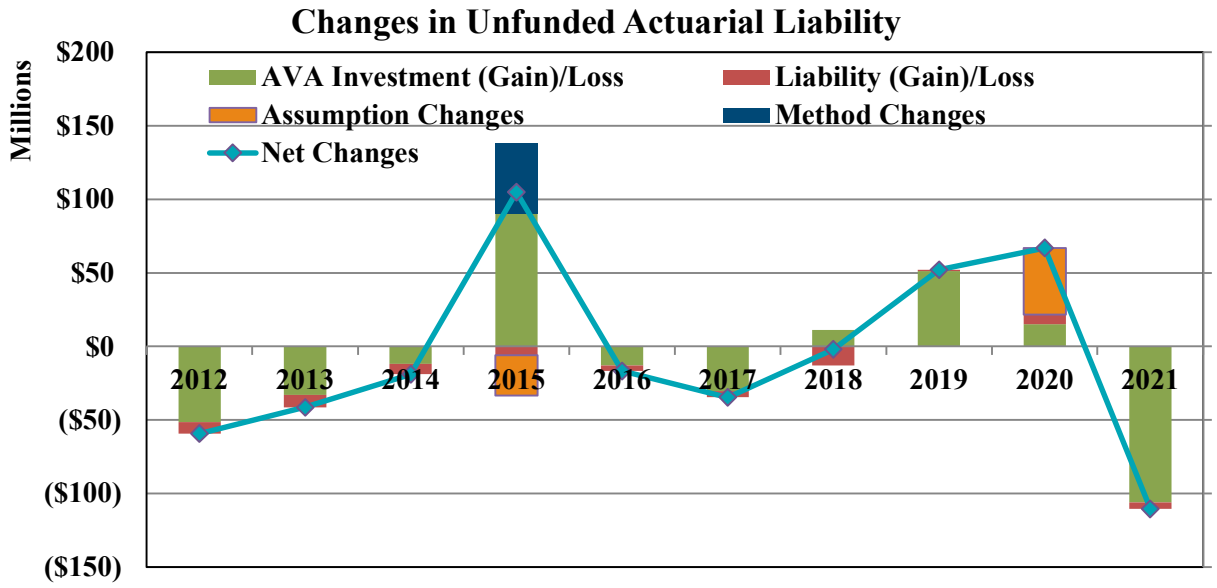


SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Longevity and other demographic risks are the potentials for mortality or other demographic experience to be different than expected. Generally, longevity and other demographic risks emerge slowly over time and are often dwarfed by other changes, particularly those due to investment returns. The System has experienced demographic gains nearly every year since 2010 with 2019 and 2020 being the exceptions with small liability losses each of those years.

Assumption change risk is the potential for the environment to change such that future valuation assumptions are different than the current assumptions. Increases in UAL from assumption changes are related to experience studies in which demographic and economic assumptions were adjusted. Assumption change risk is an extension of the other risks identified, but rather than capturing the risk as it is experienced, it captures the cost of recognizing a change in environment when the current assumption is no longer reasonable. This is demonstrated in the chart below in 2015 and 2020 when assumptions were changed.

The chart below shows how many of the risks mentioned impact the financial status of the System. While a lot of attention is given to the demographic assumptions, the primary force on the health of the System is the return on investments earned each year.



SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

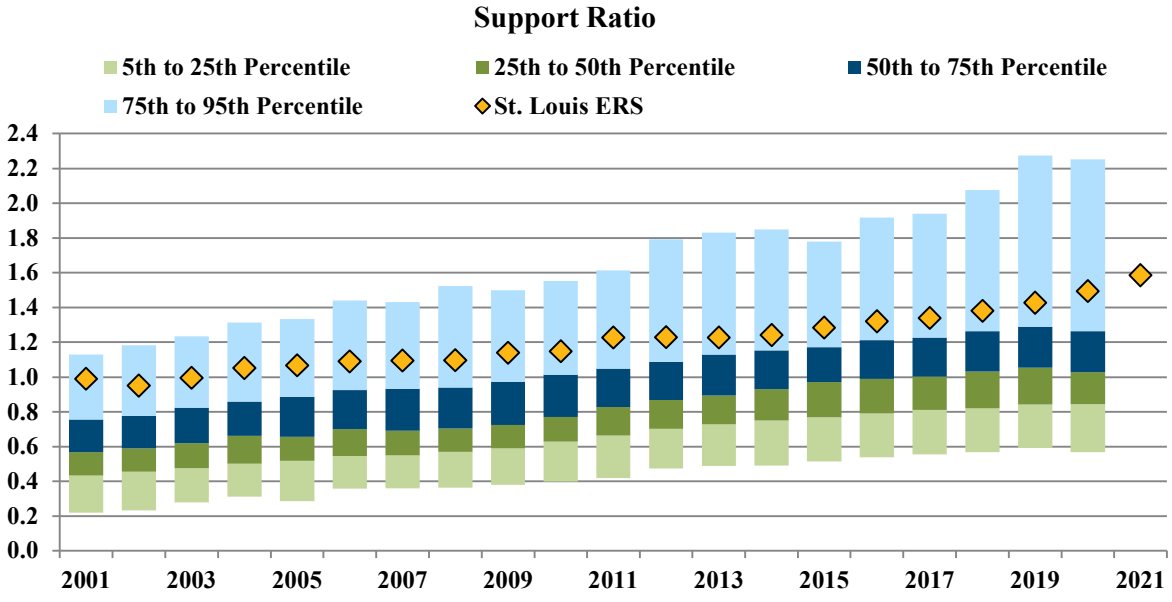
Plan Maturity Measures

The future financial condition of a mature pension plan is more sensitive to each of the risks identified above than a less mature plan. Before assessing each of these risks, it is important to understand the maturity of this System compared to other plans and how the maturity has changed over time.

Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic – the larger the plan is compared to the contribution or revenue base that supports it, the more sensitive the plan will be to risk. The measures below have been selected as the most important in understanding the primary risks identified for this system.

Inactives per Active (Support Ratio)

One simple measure of plan maturity is the ratio of the number of inactive members (those receiving benefits or entitled to a deferred benefit) to the number of active members. The revenue base supporting the plan is usually proportional to the number of active members, so a relatively high number of inactives compared to actives indicates a larger plan relative to its revenue base as well.



Survey Data from Public Plans Database as of 6/28/2021

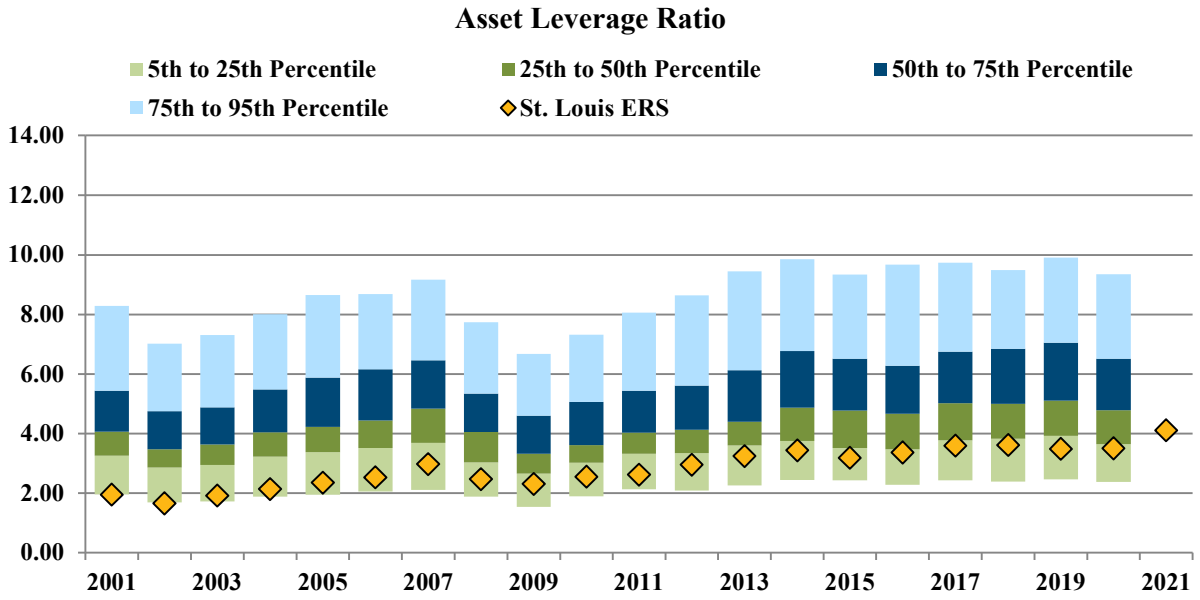
The graph above shows the distribution from the 5th to 95th percentile of support ratios for the plans in the Public Plans Data. The gold diamond shows how the Employees Retirement System of the City of St. Louis compares to the other plans.

Whereas the support ratios for the plans as a whole have increased over the period as they mature, the System's support ratio has increased over the period and is among the 75th to 95th percentile of the Public Plans Data meaning that the System is more mature than the average plan in the Database.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Leverage Ratios

Leverage or volatility ratios measure the size of the plan compared to its revenue base more directly. An asset leverage ratio of 5.0, for example, means that if the System experiences a 10% loss on assets compared to the expected return, the loss would be equivalent to 50% of payroll. The same investment loss for a system with an asset leverage ratio of 10.0 would be equivalent to 100% of payroll. As the System becomes better funded, the asset leverage ratio will increase, and if it were 100% funded, the leverage ratio would equal the Actuarial Liability (AL) leverage ratio.

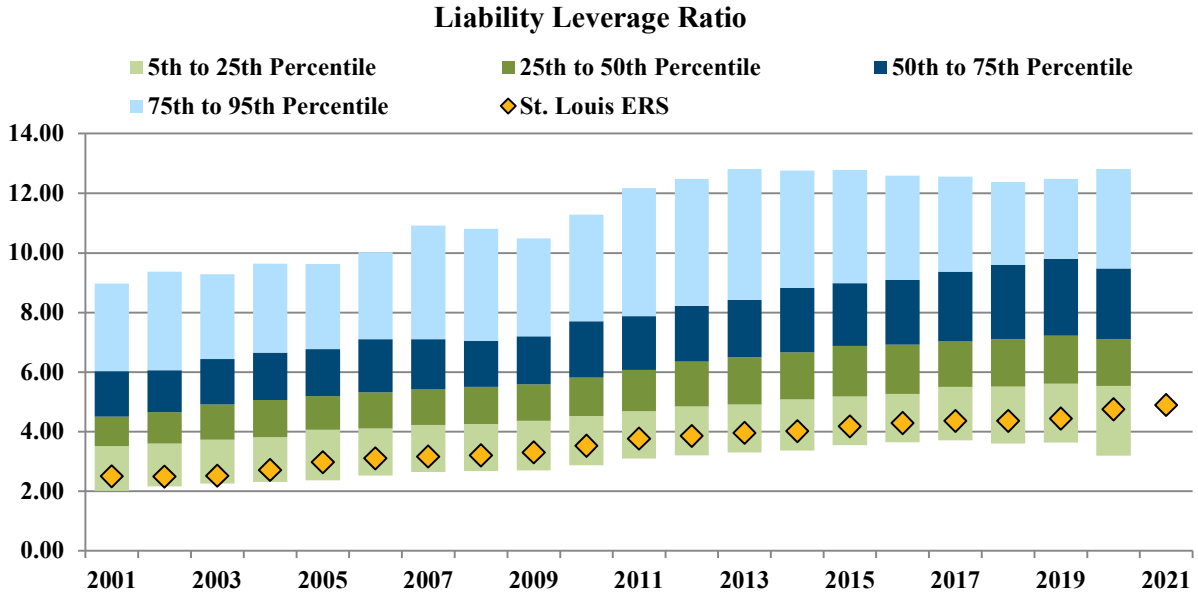


Survey Data from Public Plans Database as of 6/28/2021

The chart above shows the distribution from the 5th to 95th percentile of asset leverage ratios for the plans in the Public Plans Database. The gold diamond shows how the System compares. The System's asset leverage ratio has historically been in the 5th to 25th percentile compared to other plans. The increase in the ratio in 2021 is due to the large increase in the market value of assets combined with a decrease in payroll.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

An actuarial liability leverage ratio of 5.0 means that if the System experiences a 2% loss on liabilities, the loss would be equivalent to 10% of payroll.



Survey Data from Public Plans Database as of 6/28/2021

The chart above shows the distribution from the 5th to 95th percentile of Actuarial Liability leverage ratios for the plans in the Public Plans Database. The gold diamond shows how the System compares.

The System's Actuarial Liability leverage ratio has historically been in the 5th to 25th percentile compared to other plans, meaning that the System may be less sensitive to risk compared to the plans in the Database. But as the Plan matures and more of the liability is due to inactive members, this ratio continues to increase. The ratio has increased from about 2.5 at the beginning of the period to a ratio of about 4.9 in 2021.

SECTION III – ASSETS

Pension Plan assets play a key role in the financial operation of the System and in the decisions, the Trustees may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely impact benefit levels, employer contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on the System assets including:

- Disclosure of the System assets as of October 1, 2020 and October 1, 2021;
- Statement of the changes in market values during the year;
- Development of the Actuarial Value of Assets;
- An assessment of investment performance; and
- A projection of the System's expected cash flows for the next ten years.

Disclosure

There are two types of asset values disclosed in this valuation, the market value of assets and the actuarial value of assets. The market value represents a "snap-shot" or "cash-out" value which provides the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace. As a result, market values are usually not as suitable for long-range planning as are the actuarial value of assets which reflect the smoothing of annual investment returns.

Table III-1 below discloses and compares each asset value as of September 30, 2020 and 2021.

Table III-1
Statement of Assets at Market Value as of September 30,

Assets	2020	2021	% Change
Cash	$ 897,869	$ 918,038	2.25%
Receivables	849,113	932,114	9.78%
Temporary investments	20,906,458	12,666,633	(39.41%)
U.S Government Securities	30,906,380	40,293,106	30.37%
Corporate Bonds	33,500,950	33,099,049	(1.20%)
Global Bond Portfolio	41,405,663	42,091,220	1.66%
Stocks	235,717,423	362,081,383	53.61%
Domestic Bond Funds	63,882,498	35,899,456	(43.80%)
Managed Real Estate Fund	95,435,939	108,128,646	13.30%
Managed International Equity Funds	203,731,045	174,547,919	(14.32%)
Managed Hedge Fund of Funds	59,396,225	67,882,813	14.29%
Mutual Fund Small Cap Value	15,269,331	0	(100.00%)
Secured Bank Loan	0	44,151,927	0.00%
Accounts Payable	(632,417)	(804,479)	27.21%
Overpayment Employer Contribution	(974,801)	(1,098,021)	12.64%
Market Value of Assets	**$ 800,291,676**	**$920,789,804**	**15.06%**

SECTION III – ASSETS

Changes in Market Value

Table III-2 below shows the components of change between the market value of assets as of September 30, 2020 and September 30, 2021.

Table III-2
Changes in Market Values

Value of Assets – September 30, 2020		**$ 800,291,676**
Additions		
Payments from Members	$ 174,691	
Employer Contributions	32,804,416	
Interest and Dividends	7,467,936	
Investment Return	160,556,463	
Total Additions	**$ 201,003,506**	
Deductions		
Investment Expenses	$ 5,330,461	
Benefit Payments	74,255,118	
Administrative Expenses	919,799	
Total Deductions	**$ 80,505,378**	
Value of Assets – September 30, 2021		**$ 920,789,804**

SECTION III – ASSETS

Actuarial Value of Assets

The next table, Table III-3, shows how the actuarial value of assets is developed. The actuarial value of assets method was initialized at market value as of October 1, 2005.

The actuarial value of assets represents a "smoothed" value developed by the actuary to reduce, or eliminate, erratic results that could develop from short-term fluctuations in the market value of assets. For this System, the actuarial value has been calculated by taking the market value of assets less 80% of the investment gain (loss) during the preceding year, less 60% of the investment gain (loss) during the second preceding year, less 40% of the investment gain (loss) during the third preceding year, and less 20% of the investment gain (loss) in the fourth preceding year. The investment gain (loss) is calculated by taking the difference between the expected value of assets based on an expected return of 7.25% for the year ended September 30, 2021 and the actual value of assets. If the actuarial value of assets is less than 80% or more than 120% of the market value, an adjustment is made to the actuarial value to bring the value within this corridor. The table below illustrates the calculation of the actuarial value of assets for the October 1, 2021 valuation.

Table III-3
Development of Actuarial Value of Assets

Market value of assets at September 30, 2020		$ 800,291,676
Employer Contributions		32,804,416
Payments from Members		174,691
Benefit payments		(74,255,118)
Administrative Expenses		(919,799)
Expected return at 7.25%		56,518,311
Expected Value at September 30, 2021		$ 814,614,177
Actual Value at September 30, 2021		920,789,804
Investment (gain)/ loss		$ (106,175,627)
	Total Gain/(Loss)	**Excluded Portion**
Exclude 0% of 2017 gain/(loss)	$ 30,292,586	$ 0
Exclude 20% of 2018 gain/(loss)	(11,086,238)	(2,217,248)
Exclude 40% of 2019 gain/(loss)	(51,204,356)	(20,481,742)
Exclude 60% of 2020 gain/(loss)	(15,075,167)	(9,045,100)
Exclude 80% of 2021 gain/(loss)	106,175,627	84,940,502
Total excluded gain/(loss) for AVA calculation		$ 53,196,412
Market value of assets at September 30, 2021		$ 920,789,804
Total gain/(loss) excluded		53,196,412
Actuarial value of assets at September 30, 2021		$ 867,593,392
Actuarial value of assets as a % of Market value		94.22%

SECTION III – ASSETS

Investment Performance

The market value of assets (MVA) returned 20.88% during the plan year ending September 30, 2021, which is greater than the assumed 7.25% return. A return of 8.33% was experienced on the actuarial value of assets (AVA), resulting in an actuarial gain for the year. Below, we show additional historical returns.

Table III-4
Historical Returns

	MVA	AVA
2007	14.65%	10.17%
2008	-12.76%	5.85%
2009	-3.09%	1.52%
2010	10.11%	3.42%
2011	1.79%	1.25%
2012	16.95%	1.56%
2013	13.04%	7.99%
2014	9.63%	10.65%
2015	-3.79%	7.62%
2016	9.32%	7.58%
2017	11.55%	7.12%
2018	6.11%	6.31%
2019	1.17%	4.77%
2020	5.56%	6.36%
2021	20.88%	8.33%

SECTION III – ASSETS

Projection of System's Future Cash Flows

Table III-5
Projection of System's Expected Cash Flows

Year Beginning October 1,	Benefit Payments and Administrative Expenses	Contributions	Net Cash Flow
2021	$ 82,816,442	$ 34,501,973	$ (48,314,469)
2022	82,176,056	34,622,107	(47,553,949)
2023	84,763,699	34,606,353	(50,157,346)
2024	86,403,994	33,844,421	(52,559,573)
2025	88,254,942	32,932,685	(55,322,258)
2026	92,295,061	33,756,001	(58,539,060)
2027	94,372,732	34,599,902	(59,772,830)
2028	94,579,820	35,464,899	(59,114,921)
2029	98,381,894	36,351,522	(62,030,372)
2030	99,428,462	37,260,310	(62,168,152)

Expected contributions assume contribution rates as shown in the graph on page 6 and that payroll will increase at the actuarially assumed rate of 2.5% per year. Expected benefit payments are projected for the closed group valued at October 1, 2021. Projecting any farther than ten years using a closed-group would not yield reliable predictions due to the omission of new hires.

SECTION IV – LIABILITIES

In this section, we present detailed information on the System liabilities including:

- **Disclosure** of the System liabilities as of October 1, 2020 and October 1, 2021, and
- Statement of **changes** in these liabilities during the year.

Disclosure

Several types of liabilities are calculated and presented in this report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them.

- **Present Value of All Future Benefits:** Used for measuring all future System obligations, represents the amount of money needed today to fully fund all benefits of the System both earned as of the valuation date and those to be earned in the future by current plan participants, under the current plan provisions.

- **Actuarial Liability:** Calculated as of the valuation date as the present value of benefits allocated to service prior to that date. Effective October 1, 2015, the actuarial liability is determined using the Entry Age Normal method.

These liabilities are for funding purposes and are not appropriate for measuring the cost of settling plan liabilities by purchasing annuities or paying lump sums.

Table IV-1, which follows, discloses each of these liabilities for the current and prior valuations. With respect to each disclosure, a subtraction of the appropriate value of plan assets yields, for each respective type, a **net surplus** or an **unfunded liability**.

Table IV-1
Liabilities/Net (Surplus)/Unfunded

	October 1, 2020	October 1, 2021
Present Value of Future Benefits		
Active Participant Benefits	$ 501,692,891	$ 486,872,994
Participants currently receiving payments	580,516,750	603,787,083
Participants with a deferred vested benefit	67,989,725	69,247,082
Present Value of Future Benefits (PVB)	**$ 1,150,199,366**	**$ 1,159,907,159**
Actuarial Liability		
Active Participant Benefits	$ 435,618,987	$ 421,654,051
Participants currently receiving payments	580,516,750	603,787,083
Participants with a deferred vested benefit	67,989,725	69,247,082
Actuarial Liability (AL)	**$ 1,084,125,462**	**$ 1,094,688,216**
Actuarial Value of Assets (AVA)	$ 841,450,402	$ 867,593,392
Net (Surplus)/Unfunded (AL – AVA)	**$ 242,675,060**	**$ 227,094,824**

SECTION IV – LIABILITIES

Changes in Liabilities

Each of the Liabilities disclosed in the prior table is expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- New hires since the last valuation
- Benefits accrued since the last valuation
- Code changes impacting benefits
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, or dying at rates different than expected
- Change to actuarial or investment assumptions
- Changes to the actuarial funding method

Unfunded liabilities will change because of all of the above, and also due to changes in plan assets resulting from:

- Employer contributions different than expected
- Investment earnings different than expected
- A change in the method used to measure plan assets

In each valuation, we report on those elements of change that are of particular significance, potentially affecting the long-term financial outlook of the System. Below, we present key changes in liabilities since the last valuation.

In the table that follows, we show the components of change in the actuarial liability between October 1, 2020 and October 1, 2021.

Table IV-2

	Actuarial Liability
Liabilities October 1, 2020	$ 1,084,125,462
Liabilities October 1, 2021	1,094,688,216
Liability Increase (Decrease)	10,562,754
Change Due to:	
Plan Amendments	0
Method Changes	0
Assumption Changes	0
Experience (Gain)/Loss	(4,297,704)
Benefits Accumulated and Other Sources	14,860,458

SECTION IV – LIABILITIES

In addition, we breakdown the change in actuarial liability further by showing the total actuarial (gain)/loss by source, as shown in Table IV-3 below.

Table IV-3
(Gain)/Loss by Source as of October 1, 2021

COLA less than expected	$	(4,189,020)
Inactive mortality less than expected		(2,212,086)
Active mortality greater than expected		(2,505,613)
Non-death active decrement other than expected		1,054,699
Salary increases greater than expected for continuing actives		3,123,587
Update to sick leave balances		(156,541)
New entrants		661,663
Change to retiree DROP balances		(435,242)
Terminated vested participants deferring benefits		42,644
Participant service purchases		174,691
Miscellaneous changes		143,514
Experience (Gain)/Loss	**$**	(4,297,704)

SECTION V – CONTRIBUTIONS

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine what level (if any) of contributions is needed to properly maintain the funding status of the System. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

For this System, the funding method employed as of the October 1, 2021 valuation is the **Entry Age Normal Actuarial Cost Method**. This method is used to determine the normal cost rate at which an average level percent of pay is required to fund the retirement benefits for all participants between their dates of hire and assumed dates of retirement. The EAN actuarial liability is the difference between the plan's total present value of future benefits and the present value of future normal costs. Effective October 1, 2015, an administrative expense rate of 0.30% of payroll was added to the normal cost and changed to 0.40% as of October 1, 2020. The difference between the Entry Age Normal actuarial liability and the actuarial value of assets is the unfunded actuarial liability.

The unfunded actuarial liability as of October 1, 2015 is amortized over a fixed 20-year period as a level percentage of payroll. Future gains and losses and changes in actuarial assumptions will be amortized in layers over separate 20-year periods.

Table V-1 below presents and compares the employer contribution rates for the System for this valuation and the prior one.

Table V-1
Employer Contribution Rate

	Fiscal Year Ending 2021	Fiscal Year Ending 2022
Normal Cost Rate	5.59%	5.56%
Administrative Expense Rate	0.40%	0.40%
UAL Amortization Payment for City	9.43%	9.48%
Actuarially Determined Contribution Rate for City	15.42%	15.44%
Reduction in UAL Amortization Payment for Lawsuit Beneficiary Employers[1]	0.08%	0.08%
Actuarially Determined Contribution Rate for Lawsuit Beneficiary Employers	15.34%	15.36%

[1] See Appendix B for description of Lawsuit Beneficiary Employers

SECTION V – CONTRIBUTIONS

The Unfunded Actuarial Liability (UAL) is amortized over layered 20-year periods beginning with the total UAL as of October 1, 2015. The amortization payment as a percent of payroll is different for City Employers and for Lawsuit Beneficiary Employers. Table V-2 shows the detailed calculation of the current year UAL amortization rates for the City and Lawsuit Beneficiary Employers.

Table V-2 Amortization Schedule

	Date	Initial Amortization Period	Unamortized Amount	Remaining Amortization Period	Amortization Amount	Applicable Payroll	UAL Rate
2015 Initial Unfunded Actuarial Liability	10/1/2015	20	$172,547,288	14	$16,897,321		
2016 Actuarial (gain)/loss[1]	10/1/2016	20	(7,635,625)	15	(712,129)		
2017 Actuarial (gain)/loss[1]	10/1/2017	20	(3,503,953)	16	(312,563)		
2018 Actuarial (gain)/loss[1]	10/1/2018	20	(4,591,816)	17	(393,241)		
2019 Actuarial (gain)/loss[1]	10/1/2019	20	21,046,033	18	1,736,085		
2020 Assumption Change	10/1/2020	20	45,029,039	19	3,588,318		
2020 Actuarial (gain)/loss[1]	10/1/2020	20	15,195,597	19	1,210,921		
2021 Actuarial (gain)/loss[1]	10/1/2021	20	(10,991,739)	20	(848,390)		
Total UAL			$227,094,824		$21,166,322		
Unamortized Amounts from Library Settlement			$ (381,685)	14	$ (37,378)	$ 46,448,638 [2]	(0.08%)
Total without regard to Library Settlement			**$ 227,476,509**		**$21,203,700**	**$ 223,736,639** [3]	**9.48%**

[1] (Gain) or loss includes differences between actual and expected contributions
[2] Payroll for Lawsuit Beneficiary Employers
[3] Total payroll for all participating employers

SECTION VI – ACCOUNTING STATEMENT INFORMATION

GFOA Recommended Information

The Government Finance Officers Association (GFOA) maintains a checklist of items to be included in a public retirement system's Annual Comprehensive Financial Report (ACFR) in order to receive recognition for excellence in financial reporting. Although the Employees Retirement System does not issue a ACFR under GFOA guidelines, we have included certain schedules in this section for possible inclusion within the System's audited financial statements. These schedules are based on the funding actuarial liabilities.

- Table VI-1: Analysis of Financial Experience
- Table VI-2: Schedule of Funded Liabilities by Type
- Table VI-3: Schedule of Funding Progress

Table VI-1
Analysis of Financial Experience
Gain and Loss in Unfunded Actuarial Liability During Years Ended September 30
Resulting from Differences Between Assumed Experience and Actual Experience

	Gain (or Loss) for Year ending September 30,					
Type of Activity	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Investment Experience	$ 553,258	$ (3,004,069)	$ (9,504,274)	$(22,219,993)	$(9,292,857)	$ 8,836,482
Liability Experience	3,695,678	4,322,571	13,001,556	(872,215)	(6,489,657)	4,297,704
Gain (or Loss) During Year from Combined Experience	$ 4,248,936	$ 1,318,502	$ 3,497,282	$(23,092,208)	$(15,782,514)	$ 13,134,186
Non-Recurring Gain (or Loss) Items	0	0	0	0	(45,356,360)	0
Composite Gain (or Loss) During Year	$ 4,248,936	$ 1,318,502	$ 3,497,282	$(23,092,208)	$(61,138,874)	$ 13,134,186

SECTION VI – ACCOUNTING STATEMENT INFORMATION

Table VI-2
Schedule of Funded Liabilities by Type
Aggregate Actuarial Liabilities for

Actuarial Valuation Date October 1	Active Member Contributions (1)	Retirees & Beneficiaries (2)	Active Member Employer Financed Contributions (3)	Actuarial Value of Reported Assets	Portion of Actuarial Liabilities Covered by Reported Assets (1)	(2)	(3)
2021	$ 0	$ 673,034,165	$ 421,654,051	$ 867,593,392	100%	100%	46%
2020	0	648,506,475	435,618,987	841,450,402	100%	100%	44%
2019	0	589,148,288	426,306,456	830,686,015	100%	100%	57%
2018	0	563,779,679	432,763,603	831,005,302	100%	100%	62%
2017	0	540,747,179	449,883,176	818,839,562	100%	100%	62%
2016	0	517,161,890	456,981,189	797,664,391	100%	100%	61%
2015	0	501,123,197	453,997,444	770,006,025	100%	100%	59%
2014	0	494,664,459	417,314,687	737,967,928	100%	100%	58%
2013	0	475,937,321	413,511,258	685,397,323	100%	100%	51%
2012	0	460,581,077	406,310,985	653,001,852	100%	100%	47%
2011	0	441,520,555	400,242,766	661,932,240	100%	100%	55%

SECTION VI – ACCOUNTING STATEMENT INFORMATION

Table VI-3
Schedule of Funding Progress

Actuarial Valuation Date October 1	Actuarial Value of Assets (a)	Actuarial Liability (b)	Unfunded Actuarial Liability (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAL as Percentage of Covered Payroll [(b) - (a)] / (c)
2021	$ 867,593,392	$1,094,688,216	$ 227,094,824	79.25%	$ 223,736,639	101.50%
2020	841,450,402	1,084,125,462	242,675,060	77.62%	228,162,770	106.36%
2019	830,686,015	1,015,454,744	184,768,729	81.80%	228,673,586	80.80%
2018	831,005,302	996,543,282	165,537,980	83.39%	228,447,481	72.46%
2017	818,839,562	990,630,355	171,790,793	82.66%	227,253,901	75.59%
2016	797,664,391	974,143,079	176,478,688	81.88%	226,907,701	77.78%
2015	770,006,025	955,120,641	185,114,616	80.62%	228,422,585	81.04%
2014	737,967,928	911,979,146	174,011,218	80.92%	227,039,143	76.64%
2013	685,397,323	889,448,579	204,051,256	77.06%	224,623,445	90.84%
2012	653,001,852	866,890,445	213,888,593	75.33%	224,822,252	95.14%
2011	661,932,240	841,763,321	179,831,081	78.64%	223,060,719	80.62%

APPENDIX A – MEMBERSHIP INFORMATION

Table of Plan Coverage

	October 1, 2020	October 1, 2021	% change
Active Members in Valuation[1]			
Count	4,984	4,742	-4.9%
Average Age	48.8	48.9	0.3%
Average Service	11.7	11.7	-0.2%
Total Payroll	$ 228,162,770	$ 223,736,639	-1.9%
Average Anticipated Payroll	$ 45,779	$ 47,182	3.1%
Total Active Vested Members	3,595	3,584	-0.3%
DROP Members in Valuation			
Count	414	403	-2.7%
Average Age (Current)	61.5	61.4	0.0%
Average Age (at DROP Entry)	59.2	59.4	0.3%
Average Service	25.3	25.7	1.5%
Total DROP Account Balances	$ 17,649,703	$ 18,794,133	6.5%
Average DROP Account Balances	$ 42,632	$ 46,636	9.4%
Vested Terminated Members			0.2%
Count	2,561	2,566	
Average Age	52.0	52.2	0.4%
Average Monthly Benefit	$ 390	$ 393	0.8%
Pensioners			
Retirees	4,202	4,278	1.8%
Disabled Retirees	178	170	-4.5%
Total	4,380	4,448	1.6%
Average Age (Current)	73.1	73.0	-0.1%
Average Age (at Retirement Date)	62.1	62.2	0.1%
Average Monthly Benefit	$ 1,078	$ 1,104	2.4%
Beneficiaries in Pay Status			
Number in Pay Status	510	508	-0.4%
Number with Deferred Benefits	0	0	N/A

[1]Includes Current DROP Members

APPENDIX A – MEMBERSHIP INFORMATION

Inactive Participants by Type and Monthly Benefit Amount

Monthly Amount	Total	Retirees	Terminated Vested	Disability	Beneficiaries
Total	7,522	4,278	2,566	170	508
Under $500	3,882	1,685	1,963	53	181
$500-1,000	1,568	866	493	76	133
$1,000-1,500	810	623	78	26	83
$1,500-2,000	539	448	21	13	57
$2,000-2,500	290	263	5	1	21
$2,500-3,000	155	137	6	1	11
$3,000-3,500	84	77	0	0	7
$3,500-4,000	44	42	0	0	2
$4,000-4,500	43	38	0	0	5
$4,500-5,000	37	33	0	0	4
$5,000 & over	70	66	0	0	4

APPENDIX A – MEMBERSHIP INFORMATION

Status Reconciliation

	Active	Leave of Absence	DROP	Disabled	Retired	Beneficiary	Terminated Vested	Deferred Beneficiary	Total
Participant Count as of October 1, 2020	**4,556**	**14**	**414**	**178**	**4,202**	**510**	**2,561**	**0**	**12,435**
New hires	498	1							499
Leave of Absence	(11)	11							0
Rehires	20	(3)			(1)		(10)		6
Enter DROP	(91)		91						0
Return from DROP	38		(38)						0
Term Vested	(128)	(3)					131		0
Retired	(152)	(1)	(61)		297		(83)		0
Disabled	(4)	(1)		6			(1)		0
Deceased (with Beneficiary)	(5)	(1)		(4)	(36)	47	(1)		0
Deceased (without Beneficiary)	(10)		(3)	(10)	(185)	(33)	(18)		(259)
Transfer Out							(2)		(2)
Term Not Vested	(387)	(2)							(389)
Benefits Expired						(16)			(16)
Status Correction					1		(11)		(10)
Net Change	(232)	1	(11)	(8)	76	(2)	5	**0**	(171)
Participant Count as of October 1, 2021	**4,324**	**15**	**403**	**170**	**4,278**	**508**	**2,566**	**0**	**12,264**

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions

1. Mortality Rates:

Active: 135% of the Pub-2010 General Employee below-median income mortality table [*PubG-2010(B) Employee*] for males and 155% for females projected with generational mortality improvements from 2010 using Scale MP-2019.

Healthy: 125% of the Pub-2010 General Retiree below-median income mortality table [*PubG-2010(B) Healthy Retiree*] for males and 120% for females projected with generational mortality improvements from 2010 using Scale MP-2019.

Disabled: 120% of the Pub-2010 Non-Safety Disabled Retiree mortality table [*PubNS-2010 Disabled Retiree*] for males and 110% for females projected with generational mortality improvements from 2010 using Scale MP-2019.

The table below shows the probability of death at sample ages with the mortality table described above projected to the year 2021. A generational table is projected forward each year to account for continuous mortality improvements.

	Healthy Employees (%)		Healthy Retirees (%)		Disabled Mortality (%)	
Age	Male	Female	Male	Female	Male	Female
20	0.0587	0.0224	0.0543	0.0174	0.4668	0.2473
25	0.0668	0.0230	0.0618	0.0178	0.4736	0.2794
30	0.0987	0.0402	0.0914	0.0312	0.6836	0.4691
35	0.1343	0.0634	0.1243	0.0491	0.8781	0.6872
40	0.1652	0.0858	0.1530	0.0664	1.0686	0.9047
45	0.1988	0.1106	0.1841	0.0856	1.4225	1.2284
50	0.2750	0.1589	0.8421	0.4828	2.0484	1.7222
55	0.4201	0.2542	1.0952	0.5891	2.7441	2.1592
60	0.6535	0.3932	1.4063	0.6817	3.3467	2.3320
65	0.9297	0.5700	1.6509	0.8072	3.9280	2.5081
70	1.2912	0.8753	2.4331	1.2850	4.7735	3.1951
75	1.9540	1.4546	3.9354	2.2589	6.4355	4.7196
80	3.1072	2.4709	6.7359	4.1042	9.4360	7.4280
85	12.6073	9.8404	11.6734	7.6184	14.1070	11.5705
90	20.5854	18.0189	19.0605	13.9501	21.5522	16.4267
95	29.7686	28.3819	27.5635	21.9731	30.3703	23.6258
100	41.8115	42.0766	38.7143	32.5755	42.0547	34.5071

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

2. Disability Rates before Retirement:

	Disability (%)	
Age	Male	Female
20	0.0200	0.0200
25	0.0200	0.0200
30	0.0200	0.0200
35	0.0200	0.0200
40	0.0560	0.0346
45	0.1000	0.1074
50	0.3528	0.1802
55	0.5000	0.2530
60	0.5000	0.3258

3. Withdrawal Rates before Retirement:

Creditable Service	Withdrawal (%)	Creditable Service	Withdrawal (%)
0	22.00	13	4.50
1	18.00	14	4.00
2	16.00	15	3.50
3	14.00	16	3.00
4	12.00	17	2.50
5	11.00	18	2.00
6	10.00	19	2.00
7	9.00	20	2.00
8	8.00	21	2.00
9	7.00	22	2.00
10	6.00	23	2.00
11	5.50	24	2.00
12	5.00	25+	1.25

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

4. Retirement Rates:

Age	Retirement Rate (%)	Age	DROP Rate (%)
50 and under	2.00	50 and under	12.50
51	2.00	51	12.50
52	2.00	52	12.50
53	2.00	53	12.50
54	2.00	54	12.50
55	4.00	55	12.50
56	4.00	56	12.50
57	5.00	57	12.50
58	5.00	58	12.50
59	5.00	59	12.50
60	6.00	60	12.50
61	10.00	61	7.50
62	15.00	62	7.50
63	15.00	63	7.50
64	15.00	64	7.50
65	30.00	65	7.50
66	25.00	66	2.00
67	25.00	67	2.00
68	25.00	68	2.00
69	25.00	69	2.00
70	100.00	70	100.00

In addition, in the first year that a participant satisfies the requirements under the "Rule of 85," the DROP rate is assumed to be 70% if the age in the first year of eligibility is 56 or younger, 55% for ages 57 to 62, 30% for ages 63 to 65, and 15% for ages greater than 65 (100% at age 70).

5. Retirement Age for Inactive Vested Participants

For members who terminate employment with 30 or more years of creditable service or are eligible for a Rule of 85 Pension, immediate commencement of benefits is assumed. All others are assumed to retire at age 62.

6. DROP Participants

Participants in the DROP are assumed to remain in the DROP for 5 years. Interest to the DROP account is assumed to be credited at 6% per annum for those participants who enter the DROP after January 21, 2003. 50% of those participants electing DROP are expected to return to active employment for three years before retiring.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

7. Unknown Data for Participants

Same as those exhibited by participants with similar known characteristics. For inactive vested participants with unknown benefit amounts, $250 per month is assumed.

8. Rehires

No explicit assumption or load

9. Sick Leave

Sick leave may be used to increase either Final Average Compensation, Creditable Service, or both. Starting with the October 1, 2010 valuation, the actual unused credited sick leave hours on file were used in the valuation. Effective in July 2010, the accumulation of unused sick leave hours that can be used for benefit purposes was frozen.

10. Percent Married

80% for all participants

11. Age of Spouse

Females (or males) are three years younger (or older) than their spouses.

12. Net Investment Return

7.25% per year, net of investment expenses

13. Administrative Expenses

0.40% of payroll

14. Cost-of-Living Adjustment

2.5% per year for 10 years and 0% thereafter

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

15. Salary Increases

Varies by service, ranging from 2.50% to 4.55%.

Creditable Service	Salary Increase (%)	Creditable Service	Salary Increase(%)
0	4.55	13	3.07
1	4.26	14	3.02
2	4.19	15	2.97
3	3.98	16	2.92
4	3.83	17	2.87
5	3.69	18	2.82
6	3.49	19	2.77
7	3.44	20	2.72
8	3.33	21	2.67
9	3.27	22	2.62
10	3.23	23	2.57
11	3.17	24	2.52
12	3.12	25+	2.50

16. Increases in Social Security Table Wage Base

2.5% per year

17. Increase in Section 415 and Section 401(a)(17) limits

2.5% per year

18. Rationale for actuarial assumptions

The actuarial assumptions were adopted by the Board of Trustees to better conform with future expectations based on the recommendations made in an actuarial experience study covering the years 2014 through 2019, which was presented to the Board on April 28, 2020. The rationale for the actuarial assumptions is included within the experience study report.

19. Changes in actuarial assumptions since last valuation

None

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. Actuarial Value of Assets

The market value of assets less unrecognized returns in each of the last five years, but no earlier than October 1, 2005. Initial unrecognized return is equal to the difference between the actual market return and expected market return and is recognized over a five-year period. The actuarial value is further adjusted, if necessary, to be within 20% of the market value. The actuarial asset value was initialized at the market value as of October 1, 2005.

2. Actuarial Cost Method

The cost method for valuation of liabilities used for this valuation is the Entry Age Normal (EAN) method. This method is used to determine the normal cost rate at which an average level percent of pay is required to fund the retirement benefits for all Participants between their dates of hire and assumed dates of retirement. The EAN actuarial liability is the difference between the plan's total present value of future benefits and the present value of future normal costs. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets.

3. Amortization Method

The unfunded actuarial liability as of October 1, 2015, is amortized over a fixed 20-year period as a level percentage of payroll. Future gains and losses and changes in actuarial assumptions will be amortized in layers over separate 20 year periods.

To reflect the settlement between the Library, the Board of Trustees, and the City of St. Louis, two Unfunded Accrued Liability Amortization rates are calculated. The Library, Zoo, Art Museum, Tower Grove Park, Taxicab Commission, and Mental Health Board, collectively called the "Lawsuit Beneficiary Employers", have a reduced UAL Amortization rate to reflect the payments received due to the settlement as of the valuation date. First, the UAL amortization payment is determined for the combined plan (base payment). Second, the value of settlement payments made by the City are set up as gain bases and the Lawsuit Beneficiary Employers have a reduction in the contribution rate determined from the payment on these gain bases and their projected payroll. The City's UAL amortization payment is determined only on the base payment. The Lawsuit Beneficiary Employers' UAL amortization payment is the base payment minus the amortization of the gain bases that result from settlement payments.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

4. Valuation Software

Cheiron utilizes ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate liabilities and project benefit payments. We have relied on WinTech as the developer of ProVal. We have examined the reasonableness of the input data and assumptions, reviewed sample calculations for accuracy, reconciled the actuarial gain loss, and find the aggregate results reasonable and appropriate. We are not aware of any material inconsistencies, unreasonable output resulting from the aggregation of assumptions, material limitations, or known weaknesses that would affect this actuarial valuation.

Projections in this valuation were developed using P-scan, our proprietary tool for the intended purpose of developing projections. The projections shown in this report cover multiple individual scenarios and the variables are not necessarily correlated. We are not aware of any material inconsistencies, unreasonable output resulting from the aggregation of assumptions, material limitations, or known weaknesses that would affect the projections shown in this report.

5. Changes in Actuarial Methods Since Last valuation

None

APPENDIX C – SUMMARY OF PLAN PROVISIONS

1. Plan Year

October 1 through September 30

2. Final Average Compensation

One-half the sum of:

(a) The total compensation earned during the last two highest consecutive years of Creditable Service prior to termination (subject to the Section 401(a)(17) limit); and

(b) The balance of sick leave pay as of the date of retirement less sick leave hours paid upon termination and less sick leave hours considered as Creditable Service. Said balance cannot exceed 25% of a member's total sick leave pay as of the date of retirement. The amount of credited sick leave was frozen on July 17, 2010.

3. Benefit Compensation Base

Amount of annual compensation with respect to which old age and survivor's insurance benefits would be provided to the member under the Social Security Act in effect on the date the Benefit Compensation Base is determined calculated when the member terminates employment.

4. Normal Retirement

Age Requirement: 65

Service Requirement: Five years of Creditable Service.

Amount: The product of:

(a) 1.30% of Final Average Compensation up to the Benefit Compensation Base, plus 2.05% of Final Average Compensation in excess of the Benefit Compensation Base, and

(b) Creditable Service:

Minimum $200 per month for retirees with 12 or more years of creditable service.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

5. Rule of 85 Retirement

Age/Service Requirement:	Sum of age and Creditable Service at date of termination equals or exceeds 85.
Amount:	The product of: (a) 1.30% of Final Average Compensation up to the Benefit Compensation Base, plus 2.05% of Final Average Compensation in excess of the Benefit Compensation Base, and (b) Creditable Service.

6. Early Retirement

Age/Service Requirement:	Age 60 with five years of Creditable Service; or age 55 with 20 years of Creditable Service; or any age with 30 years of Creditable Service.
Amount:	Normal retirement amount reduced by 1/3% for each month benefit begins before age 65.

7. Disability

Age Requirement	None
Service Requirement	Five years of Creditable Service and an active employee at disablement.
Amount	Normal retirement amount based on Creditable Service and Final Average Compensation at disability, payable immediately.

8. DROP (Deferred Retirement Option Plan)

Members who have achieved eligibility for retirement can continue active employment and defer receipt of their retirement allowance for a period not to exceed five years. During the DROP period, the member's retirement allowance will be paid directly into a separate account.

Service during the DROP period shall not be counted as Creditable Service, nor shall it count toward determination of retirement allowance. A member's DROP account shall not be adjusted for any cost-of-living increases during participation in the DROP. No member returning to non-DROP status shall make any withdrawal from his/her DROP account until after termination of employment.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

The account balance is credited with interest annually. In no event does the total account balance exceed the accumulated value of five-years-payments with interest.

The annuity awarded upon full termination and subsequent benefit receipt reflects the unused sick-leave conversion to Creditable Service and/or Final Average compensation. During participation in the DROP, the annual deposit to the account does not reflect any conversion of unused sick leave as each participant continues to accrue sick leave hours. The unused credited sick leave hours were frozen as of July 17, 2010.

9. Vesting

Age Requirement:	None
Service Requirement:	Five years of Creditable Service
Amount:	Normal or early service retirement amount

10. Spouse Pre-Retirement Death Benefit

Age Requirement:	None
Service Requirement:	Five years of Creditable and an active employee
Amount:	If married, 100% of the benefit the employee would have received had he or she retired the day before he or she died and elected the joint and 100% survivor option. If the employee died prior to eligibility for early service retirement, the spouse's benefit is deferred to the employee's earliest retirement date. Death benefits may also be payable to members who have terminated employment. The costs of those benefits are paid for by the reduction of the accrued benefit payable to the inactive vested participant.

11. Post-Retirement Death Benefit

If married, the employee and spouse may elect to have pension benefits paid in the form of a 100% joint and survivor annuity. A member may also elect a ten year certain and life equivalent form of benefit. If any one of these options is elected, the benefit amount otherwise payable is reduced to reflect the coverage. If not elected, benefits are payable for the life of the employee without reduction.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

12. Cost-of-Living Adjustment (COLA)

Based on the change in the Consumer Price Index (CPI) for the fiscal year, subject to a maximum increase of 3.125% per year (3.0% for retirements between March 21, 1972 and March 26, 1974; none for retirements prior to March 21, 1972), with a cumulative percentage increase (equal to the sum of the annual percentage increases) limited to 25%. If the increase in CPI is less than 1.0%, no adjustment is made. If the change is a decrease, the cost-of-living adjustment shall be zero unless the decrease is 3.125% or more. Adjustments begin on the second January 1 after payments begin.

13. Creditable Service

Number of years and completed months of service during which the member receives compensation after April 1, 1960. Creditable Service for employment prior to April 1, 1960 is granted only if the member was an employee of an employer of the System on April 1, 1960. Unused credited sick leave shall be considered as Creditable Service provided the member does not receive payment for the sick leave. The amount of credited sick leave was frozen on July 17, 2010.

14. Membership

Immediate upon employment

15. Section 415 limit

$230,000, effective January 1, 2021

16. Section 401(a)(17) limit

$290,000, effective January 1, 2021

17. Changes Since Last Valuation

None

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